

LEGM75BE120L4H7

IGBT Power Module

Features:

- $V_{CE}=1200V$ $I_C=75A$
- Low $V_{CE(sat)}$
- TRENCHSTOP™ IGBT7
- V_{CEsat} with positive temperature coefficient
- Overload operation up to 175°C
- Isolation Type Package

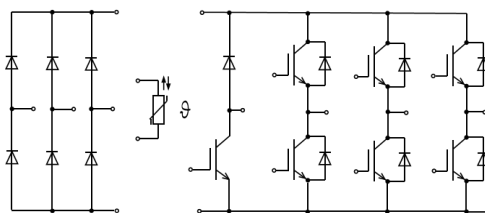
Applications:

- The inverter
- Motor control and drives

Package Type & Internal Circuit



L4



Internal Circuit

Maximum Rated Values (IGBT Inverter)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	$V_{EC}=0V, I_C=1mA, T_{vj}=25^\circ C$	1200	V
I_C	Continuous Collector Current	$T_C=100^\circ C$	75	A
I_{CRM}	Peak Collector Current	$I_{CRM}=2I_C$	150	A
V_{GES}	Gate-Emitter Voltage	$T_{vj}=25^\circ C$	± 30	V

Characteristics Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=75\text{ A}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^{\circ}\text{C}$		1.6		V
		$I_C=75\text{ A}, V_{GE}=15\text{ V}, T_{vj}=175\text{ }^{\circ}\text{C}$		2.1		V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=1.5\text{ mA}, V_{CE}=V_{GE}, T_{vj}=25\text{ }^{\circ}\text{C}$	5.0	5.7	6.5	V
I_{CES}	Collector-Emitter Cut-off Current	$V_{CE}=1200\text{ V}, V_{GE}=0\text{ V}, T_{vj}=25\text{ }^{\circ}\text{C}$			1	μA
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^{\circ}\text{C}$			100	nA
R_G	Integrated gate resister			4.2		Ω
C_{ies}	Input Capacitance	$V_{CE}=25\text{ V}, V_{GE}=0\text{ V},$ $f=1\text{ MHz}$		10.3		nF
C_{oes}	Output Capacitance			0.31		nF
C_{res}	Reverse Transfer Capacitance			45.7		pF
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=75\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=5\text{ }\Omega$ $T_{vj}=25\text{ }^{\circ}\text{C}$		103		ns
t_r	Rise Time, Inductive Load			34		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			239		ns
t_f	Fall Time, Inductive Load			200		ns
E_{on}	Turn-on Energy Loss per Pulse			2.5		mJ
E_{off}	Energy Loss per Pulse			5.7		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=75\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=5\text{ }\Omega$ $T_{vj}=175\text{ }^{\circ}\text{C}$		123		ns
t_r	Rise Time, Inductive Load			41		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			294		ns
t_f	Fall Time, Inductive Load			357		ns
E_{on}	Turn-on Energy Loss per Pulse			5.6		mJ
E_{off}	Energy Loss per Pulse			8.8		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.47	K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		175	$^{\circ}\text{C}$
I_{SC}	SC data	$V_{GE}\leq 15\text{ V}, V_{CC}=900\text{ V}$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$ $t_p\leq 10\text{ }\mu\text{s}, T_{vj}=150\text{ }^{\circ}\text{C}$		375		A

Maximum Rated Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	$T_{vj} = 25\text{ }^{\circ}\text{C}$		1200		V
I_F	Continuous DC Forward Current	$T_C = 100\text{ }^{\circ}\text{C}$		75		A
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{ ms}$		150		A
I^2t	I^2t Value	$V_R = 0\text{ V}$, $t_p = 10\text{ ms}$, $T_{vj} = 150\text{ }^{\circ}\text{C}$		1200		A^2s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 75\text{ A}$, $V_{CE} = 0\text{ V}$, $T_{vj} = 25\text{ }^{\circ}\text{C}$		1.7		V
		$I_F = 75\text{ A}$, $V_{CE} = 0\text{ V}$, $T_{vj} = 175\text{ }^{\circ}\text{C}$		2.1		V
t_{rr}	Reverse Recovery time	$I_F = 75\text{ A}$, $V_R = 600\text{ V}$ $-di/dt = 1200\text{ A/us}$ $T_{vj} = 25\text{ }^{\circ}\text{C}$		200		ns
Q_r	Recovered Charge			4		μC
E_{rec}	Reverse Recovery Energy			1.3		mJ
t_{rr}	Reverse Recovery time	$I_F = 75\text{ A}$, $V_R = 600\text{ V}$ $-di/dt = 1200\text{ A/us}$ $T_{vj} = 175\text{ }^{\circ}\text{C}$		218		ns
Q_r	Recovered Charge			7.4		μC
E_{rec}	Reverse Recovery Energy			4.55		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.65	K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		175	$^{\circ}\text{C}$

Maximum Rated Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}=25\text{ }^{\circ}\text{C}$		1800		V
I_{FRMSM}	Maximum RMS forward current per chip	$T_c=80\text{ }^{\circ}\text{C}$		75		A
I_{RMSM}	Maximum RMS current at rectifier chip	$T_c=80\text{ }^{\circ}\text{C}$		100		A
I_{FSM}	Surge forward current	$t_p=10\text{ms } T_{vj}=25\text{ }^{\circ}\text{C}$		600		A
I^2t	I^2t -value			1800		A ² S
I_{FSM}	Surge forward current	$t_p=10\text{ms } T_{vj}=150\text{ }^{\circ}\text{C}$		470		A
I^2t	I^2t -value			1100		A ² S

Characteristic Values (Diode Rectifier)

V_F	Forward voltage	$T_{vj}=150\text{ }^{\circ}\text{C } I_F=75\text{ A}$		1.35		V
I_R	Reverse current	$T_{vj}=150\text{ }^{\circ}\text{C } V_R=1800\text{ V}$		1.3		mA
R_{thjc}	Thermal resistance junction to case	per diode		0.65		K/W

Maximum Rated Values (IGBT Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{CES}	Collector-emitter voltage	$T_{vj}=25\text{ }^{\circ}\text{C}$		1200		V
I_C	Continuous Collector Current	$T_C = 100^{\circ}\text{C}$, $T_{vj\text{ max}} = 175^{\circ}\text{C}$		50		A
I_{CRM}	Peak Collector Current	$I_{CRM}=2I_C$		100		A
V_{GES}	Gate-Emitter Voltage	$T_{vj}=25\text{ }^{\circ}\text{C}$	-20		20	V

Characteristic Values (IGBT Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=50\text{ A}$, $V_{GE}=15\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		1.9	2.3	V
		$I_C=50\text{ A}$, $V_{GE}=15\text{ V}$, $T_{vj}=150\text{ }^{\circ}\text{C}$		2.3	2.7	V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=5.0\text{ mA}$, $V_{CE}=V_{GE}$, $T_{vj}=25\text{ }^{\circ}\text{C}$	5	6.0	6.5	V
I_{CES}	Collector-Emitter Cut-off Current	$V_{CE}=1200\text{ V}$, $V_{GE}=0\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$			1.2	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}$, $V_{GE}=15\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$			410	nA
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=50\text{ A}$, $V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=15\Omega$ $T_{vj}=25\text{ }^{\circ}\text{C}$		42		ns
t_r	Rise Time, Inductive Load			42		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			230		ns
t_f	Fall Time, Inductive Load			128		ns
E_{on}	Turn-on Energy Loss per Pulse			4.2		mJ
E_{off}	Energy Loss per Pulse			1.8		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=50\text{ A}$, $V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=15\Omega$ $T_{vj}=150\text{ }^{\circ}\text{C}$		48		ns
t_r	Rise Time, Inductive Load			45		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			260		ns
t_f	Fall Time, Inductive Load			248		ns
E_{on}	Turn-on Energy Loss per Pulse			8.23		mJ
E_{off}	Energy Loss per Pulse			4.9		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.55	K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		150	$^{\circ}\text{C}$

Maximum Rated Values (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	$T_{vj}=25\text{ }^{\circ}\text{C}$		1200		V
I_F	Continuous DC Forward Current	$T_c=100\text{ }^{\circ}\text{C}$		30		A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ ms}$		60		A
I^2t	I^2t Value	$V_R=0\text{ V}$, $t_p=10\text{ ms}$, $T_{vj}=150\text{ }^{\circ}\text{C}$		550		A ² s

Characteristics (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=30\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		1.6	2.3	V
		$I_F=30\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj}=150\text{ }^{\circ}\text{C}$		1.8		V
t_{rr}	Reverse Recovery time	$I_F=30\text{ A}$, $V_R=600\text{ V}$ -di/dt=100A/us $T_{vj}=25\text{ }^{\circ}\text{C}$, $V_{GE}=-15\text{ V}$		170		ns
Q_r	Recovered Charge			0.98		uC
E_{rec}	Reverse Recovery Energy			0.35		mJ
t_{rr}	Reverse Recovery time	$I_F=30\text{ A}$, $V_R=600\text{ V}$ -di/dt=100A/us $T_{vj}=150\text{ }^{\circ}\text{C}$ $V_{GE}=-15\text{ V}$		205		ns
Q_r	Recovered Charge			1.09		uC
E_{rec}	Reverse Recovery Energy			0.36		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			1.0	K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		150	$^{\circ}\text{C}$

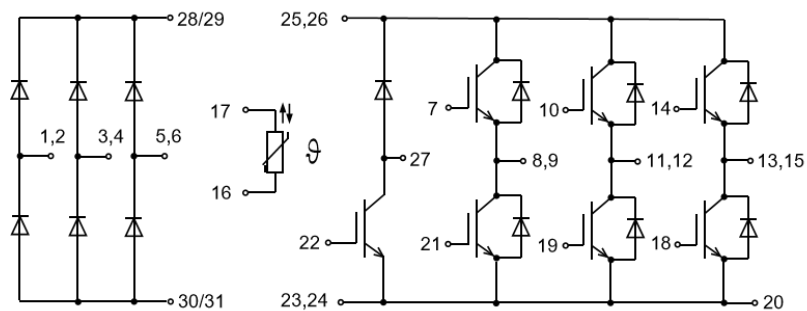
NTC-Thermistor (Characteristic Values)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated resistance	$T_c=25\text{ }^{\circ}\text{C}$		5		K Ω
$\Delta R/R$	Deviation of R100	$T_c=100\text{ }^{\circ}\text{C}$	-5		5	%
P_{25}	Power dissipation	$T_c=25\text{ }^{\circ}\text{C}$			20	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298,15K))]$		3380		K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298,15K))]$		3450		K

Module Characteristics

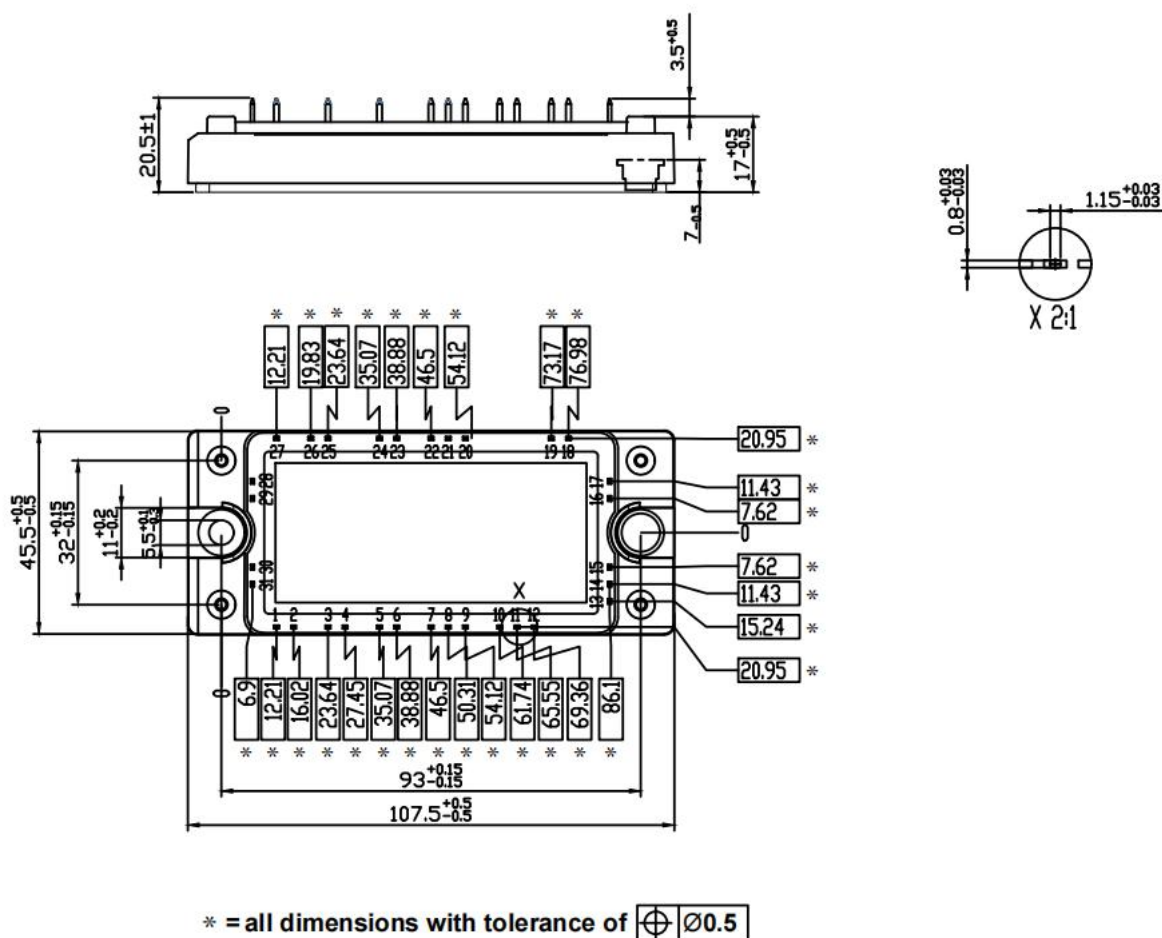
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{isol}	Isolation voltage	$t=1\text{min}, f=50\text{Hz}$	2500			V
T_{stg}	Storage Temperature		-40		125	$^{\circ}\text{C}$
M_s	Module-to-Sink Torque	Recommended(M5)	3.0		6.0	N·m
G	Weight of Module			300		g

Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



DISCLAIMER

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